PATENT
(Docket No. IN-5383)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of
William Norris and
Josef Rademacher

Serial No.: 09/964,713

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For: Curable Powder Coating Composition Including a Color Effect-Providing Pigment

Group Art Unit: 1713

Examiner: P. Niland

I hereby certify that the attached correspondence is being deposited with the United States Patent and Trademark Office via facsimile to facsimile number (703) 872-9310 on September 26, 2003.

Marjorie Ellis

DECLARATION UNDER 37 CFR § 1.132

I Daniel Johnson hereby say and declare that:

I have been employed by BASF Corporation in the area of automotive color design for 18 years. I received a B.S. degree in Chemistry from the University of Michigan in 1985, and a Juris Doctorate from Wayne State University 1991.

In order to demonstrate the unexpected and advantageous results of optically variable pigment in a powder coating composition I prepared the following comparative results.

Four coatings were prepared as follows: 1) a high solids solvent borne coating, 2) a waterborne coating, 3) a powder coating were prepared and a pigment mixture of 20% carbon black and 80% Chromaflair® gold to silver optically variable pigment was added to each coating. An additional powder coating was prepared using aluminum pigment and carbon black in a powder coating to show the effect of the aluminum. The coatings were applied to steel panels, baked and reviewed for color development.

The following results for DOI (Distinctness of Image) were obtained using the test method defined by ASTM E430-91the samples is as follows:

Coating Type	DOI
High Solids-Chromaflair and Carbon black:	87
Waterborne- Chromaflair and Carbon black:	96
Powder- Chromaflair and Carbon black:	99

The appearance results obtained were that the high-solids coating was darker than the waterborne and powder coatings. The high-solids color could only be tinted by using 40% less black pigment, resulting in poorer hiding and requiring that the level of Chromaflair® pigment be increased from 4.57g per 100 grams of paint to 6.68g per 100 grams of paint to obtain equivalent hiding. This raised the cost of the Chromaflair® pigment used from $511.80 to $748.16 per gallon (based on 3200g of paint per gallon, and $3500 per kg of Chromaflair®).

The water-borne coating composition had poor appearance due to the fact that the pigment mixture was unstable in the water-borne coating composition, and pigment particles were more visible in the composition.

The powder coating containing the aluminum and black pigment showed minimal interaction of the pigments and the aluminum pigment was concentrated at the pigment surface.

The powder coating made with Chromaflair® and carbon black pigment provided good hue and color shift. Pigment particles were not as evident in the cured powder coating as in the waterborne and had a finer appearance. The interaction between the black pigment and optically variable Chromaflair® pigment was enhanced in the powder coating, and more black pigment and less Chromaflair® pigment was required to obtain the same result as the solvent-borne coating. This provides a much less expensive coating, as approximately 4 kg of powder is used in coating a car, which means 153.8g of Chromaflair® pigment. Assuming the same $3500/kg cost for Chromaflair® used in the high solids example, the cost of a powder coated car would be $538.46 vs. $748.16 for the comparable high solids car. (assuming 1 gallon paint used to paint the car)

The result of obtaining a powder coating with good hue and color shift that showed improvement over a solvent-borne or water-borne coating was unexpected due to the fact that the viscosity of the melted powder is higher than the viscosity of either the waterborne or solvent-borne coating compositions. It was thought that color shift and effect would be compromised because pigment

would concentrate at the surface and look like a Chromaflair® masstone, giving no interaction of the optically variable Chromaflair® pigment with the straight shade pigment.

Generally in a liquid coating composition, a metallic pigment such as aluminum or an effect pigment provides a specific effect due to solvent in the coating, (solvent may include water). Pigment orientation is enhanced depending on the type and the amount of solvent dispersing the pigment. Upon heating, the solvent volatilizes and the film shrinks to facilitate optimum pigment orientation.

Generally, in a powder coating, due to the viscosity of the melted powder as the paint is heated to cure it, the paint is more viscous and the pigment is less likely to be evenly dispersed in the paint film. There is no solvent to aid in dispersing the pigment and the film does not shrink upon curing. When solvent was added in a small amount to the Chromaflair® pigment for the powder coating the pigment agglomerated. The powder coating with aluminum and black pigment showed the aluminum remaining on the surface and provided minimal interaction of the aluminum with the black pigment. It was expected that flaked pigments like Chromaflair® would tend to sit on the top of the film and not interact with the other pigments used. Surprisingly, the Chromaflair® pigment interacted better with the additional black pigment than other flaked pigments like aluminum, as shown by the example of the powder coating with aluminum.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements and the like made herein are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code, and may jeopardize the validity of the application or any patent issuing thereon.

Signed: Daniel W Johnson
Daniel Johnson

Date: September 26, 2003